CS449- Assignment-4-

Heuristics/Inspection Based Usability Testing of a Virtual Reality Application Report

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1- VR App Info and 2 pass process

VR Space Stalker is an interactive virtual reality game which is developed by the Fibrum. Users can download VR Space Stalker from both IOS and Android platforms and can play it using a VR glass. The main objective of the game is successfully compliting the mission and passing levels by navigating the spaceship using VR glasses while running away from rocks, obstacles, and bombs and at the same time targeting and shooting enemies and bombs to eleminate danger. To increase gaming experience and satisfaction, VR Space Stalker game presents 360-degree visual and audio experience with using VR glasses, immersive sound effects and background music. This game also presents 3D space themed visuals such as rocks and spaceships. To play this game with best gaming experince users require a mobile device and a VR headset. Firstly, game begins with a sign-up or login process which requires email validation and password for new users. After completing the signup page, game redirects players to the home base. In home base, players can select the appropirate mission or players can upgrade their guns or develop their spaceship. Players can pick the choice they want by focusing on specific choice. After picking the first mission, player try to run away from the obstacles and try to shoot enemies by focusing on the specific target or place. So players move their head for both aim, shoot the enemy and navigate spaceship. By following on screen instructions from game, eleminating enemies and navigating spaceship players pass levels and complete missions. Completing the levels depend on the hardness of the level and also user skill and familiarity with VR in avarage it takes 5–10 minutes to complete one level. As for my experience, installation took 2 minutes but after that there was not enough guidance about the signup so it took about 10 minutes to signup to the game and start my playing experince. After that, There was not enough explanation about how to start playing and how to control and navigate spaceship and shoot enemies and it took approximately 15 minutes to get used to game. After I have get used to the game, I have played around 40 minutes and completed 4 levels. In the first pass of the heuristic evaluation, I have looked at the game in a general manner to identify obvious usability issues. As I mentioned earlier, I have spent approximately 15 minutes to get used to game, observe navigation,controls systems and interface design. I immediatly see that there are some problems such as game do not include a pause menu, feedback for actions like firing or hitting targets, navigating spaceship. In the second pass, I investigated a detailed evaluation using some heuristics and I have realized that there are some problems and missing structures such as inconsistency in cockpit design, unrealistic speed and distance metrics, and the absence of help or documentation based on these problems I have developed solutions which are given in a table below.

2- Heuristics Evaluation

Heuristics	Explanation of the Problems	Propose Solution(s)	Seriousness	Why?
Visibility of system status	1) No dynamic display of remaining ammunition information. (Figure 1) 2) In both large and narrow screens options button is not clearly visible in VR mode during gameplay. 3) The system indicators of the phone cannot be seen when using it in narrow screen option. (Figure 1 and Figure 2)	1) Add visible counters for ammo informations. 2) Redesign the placement of the options button. 3) Different type of screens must be considered again.	1) High 2) High 3) High	1) The system should inform player about some informations such as ammo, health while playing. 2) Players need to access to the critical settings to be able to change game settings such as viewing perspective narrow or large screen. 3) System should clearly present system status to the players.
Match between system and the real world.	1) The spaceship's speed in the info panel is unrealistically low for a space environment.(Figure 3) 2) Distance to the target information is low for a space enviroment.And the unit of distance in space enviroment is not present with miles.(Figure 3)	1) Update the speed metric to a more realistic number such as 30,000 mph and dynamically change it. 2) Change the unit of measurement to something more appropriate for space travel, such as kilometers or astronomical units (AU).	1) Middle 2) Middle	1) This issue reduces the sense of realism in a VR enviroment. 2) Players may feel disconnected from the realistic space experience if distances are not scaled appropriately for interstellar travel.
User control and freedom.	1) Players cannot undo or redo their actions such as selecting an option or firing a weapon they are forced to commit to the action without a way to back out or correct their mistakes.(Figure 4-Figure 5) 2) Players cannot go back or quit when they select wrong mission or start a new level.(Figure 5) 3) Players cannot stop restart the game while playing.	1) Redesign and put an option to undo the actions such as cancel the shooting. 2) Ask for confirmation prompt before critical actions like mission selection or starting a new level. 3) Add a pause menu which allows users to return to the main menu or restart gameplay.	1) High 2) Middle 3) High	1) Player cannot cancel their actions and this reduces real life experince and also user satisfaction. 2) Players can select wrong choices and this can lead user frustration. 3) Players cannot pause or restart so this could result with user frustration since they play again and again same level.
Consistency and standards	1) Different terms may be used for the same concept such as "energy" in one panel vs. "power" in another. 2) UI elements, such as fonts, button styles, and placements should vary between narrow and large screen. (Figure 1 and Figure 2)	1) Reusing and Standardizing terminology across all interfaces and screens. 2) Apply uniform design standards for all UI elements.	1) Middle 2) Middle	1-2) Inconsistencies create cognitive load.Players has to interpret the meaning of different terms and players have to get familiar with varying interfaces which reduce the reliability of the game.

Error prevention	1) There is no confirmation step when selecting critical options such as starting a new mission.(Figure 4 -Figure 5) 2) There is no confirmation step while changing the screen size	1-2) Implement confirmation dialogs for critical actions such as while selecting a mission or changing the screen view system should give a prompt such as "Are you sure?"	1) High 2) High	1-2) VR is more realistic preventing errors will reduce players frustration and increase satisfaction.
Recognition rather than recall	1) When user is firing or navigating there are no specific instructions. Instructions for interacting with the game are not visible during game, system is expect to remember and memorize the movements from earlier stages. (Figure 1) 2) The green lightning icon or orange triangle are not labeled or explained by the game and this forces players to recall their functions from memory after encountering them. (Figure 1 and Figure 3) 3) During registration and login page keyboard transactions are hard to track.(Figure 6)	1) Implement a help menu which clearly describes all controls and navigate user. 2) Add visible labels or tooltips for all power-ups, cockpit panels, and mission objectives. 3) Increase the keyboard user interaction	1) Middle 2) Middle 3) Low	1-2) System do not navigate player and share good source for control and flow of the play which increases cognitive load and frustrate players. 3) Because of the slow reaction of the keyboard users can frustrated.
Flexibility and efficiency of use	1) There are no shortcuts or custom controllers such as customizable controls. All players must play same. 2) Players cannot customize their UI such as players cannot change the apperance of their cockpit in the spaceship. (Figure 3)	1-2) Introduce new shortcuts and redesign the interface which allow users to customize their cockpit or base.	1) Low 2) Low	1-2) The customization of the game screens will increase the user satisfaction and also will be align with real life experince.
Aesthetic and minimalist design	1) There are design inconsistencies between screens and lots of redundant information is given.	1) Redesign the screens and interfaces to provide consistency between screens and also do not allow unneccessary components, ensure consistency and modern look.	1) Low	1) Irrelevant informations reduces the player's ability to focus on critical actions and also bad design took the attention of player

Help users recognize, diagnose, and recover from errors	1) If players lose a mission, the game does not give any feedback on why the mission failed. 2) There are no hints when players are stuck and do not know what to do next.	1) Implement plain-language error messages which describes the problem and suggest actions. 2) Construct a hint system that gives feedback how to overcome misson.	1) Middle 2) Middle	1-2) Without giving some clues and hint user can be frustrated and quit from the game.
Help and documentation	1) There is no help menu for controls, power-ups, or navigate the interface. 2) There is no clear explanation about the possible problems such as VR tracking problems	1) Providing a clear help menu which descirbes all controls navigations. 2) Designing a section which describes all possible problems and how to solve them	1) High 2) Middle	1-2) This problems forces players to trial-and-error method and because of this users can give up.

3- References

- Nielsen Norman Group. (n.d.). 10 usability heuristics applied to virtual reality. Nielsen Norman Group. Retrieved from *https://www.nngroup.com/articles/usability-heuristics-virtual-reality/*
- Nielsen Norman Group. (n.d.). 10 usability heuristics applied to video games. Nielsen Norman Group. Retrieved from https://www.nngroup.com/articles/usability-heuristics-applied-video-games/
- Nielsen, J. (n.d.). 10 usability heuristics for user interface design. Nielsen Norman Group. Retrieved from *https://www.nngroup.com/articles/ten-usability-heuristics/?lm=usability-heuristics-applied-video-games*

4- Figures

Figure 1 : Player cockpit in large screen mode

Figure 2: Player cockpit in narrow screen mode

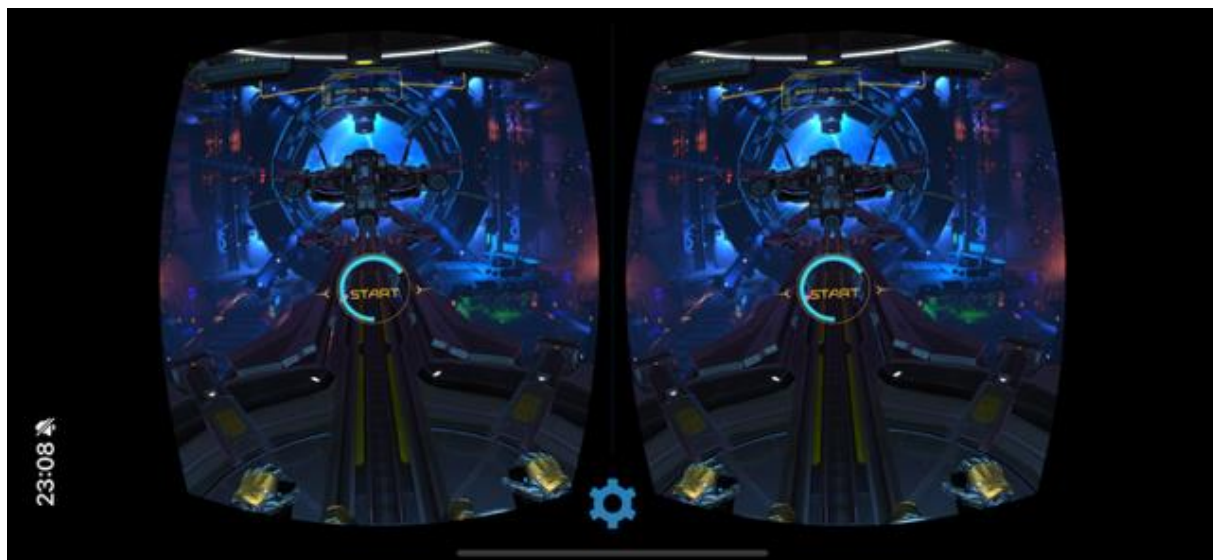*Figure 3: Player Cockpit Informations (speed and distance)*
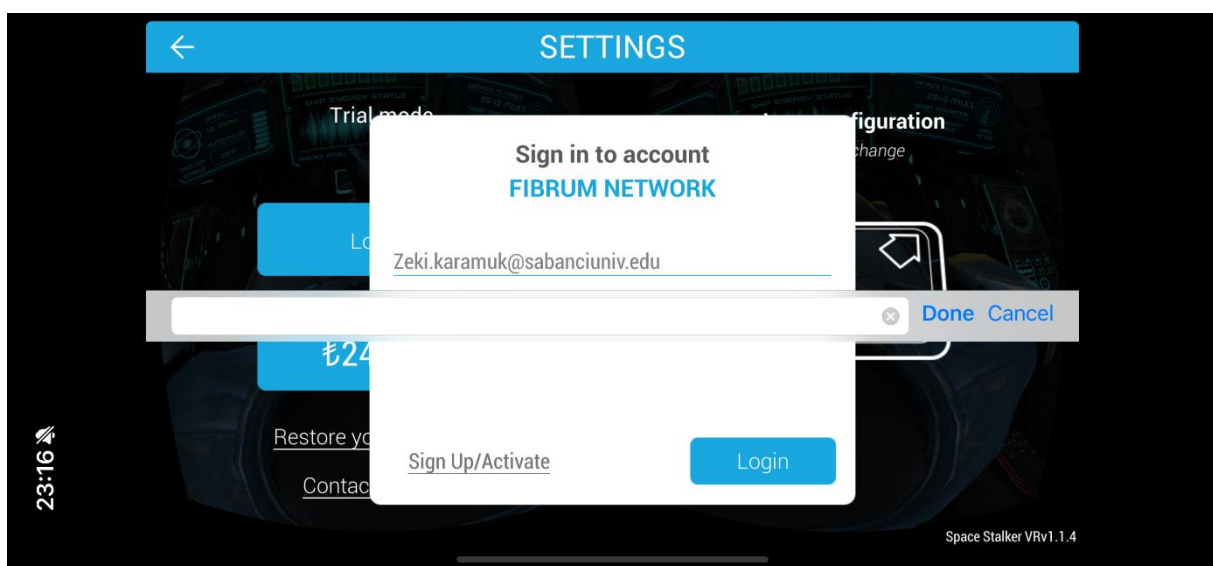

Figure 4:Home Screen

Figure 5:Mission start screen

Figure 6:Login Page